

[0032] Referring firstly to the first subsystem 10A, it further includes a third linkage 16C and a fourth linkage 16D. Each linkage 16A to D includes a respective first portion 48 and a respective second portion 72 spaced from the first portion 48 thereof. The first portion 48 of the third linkage 16C is pivotally connected to the second portion 72 of the first linkage 16A. The linkage 16C can pivot relative to the linkage 16A about a third pivot axis 50C. The first portion 48 of the fourth linkage 16D is pivotally secured to the second portion 72 of the second linkage 16B. The linkage 16B can pivot relative to the linkage 16B about a fourth vertical pivot axis SOD. The second portions 72 of the third and fourth linkages 16C and 16D are pivotally secured to one another. The third and fourth linkages can pivot relative to one another about a fifth vertical pivot axis.

[0033] In use, when viewed from above, clockwise rotation of the first and second linkages 16A and 16B causes movement of the second portion of the third linkage 16C in a direction 76. Counterclockwise rotation of the first linkage 16A and clockwise rotation of the second linkage 16B causes movement of the second portion 72 of the third linkage 16C in the opposite direction of 78. When viewed from the left, counterclockwise rotation of the first and second linkages 16A and 16B causes movement of the second portions 72 of the third linkage 16C in an upward direction 78. The second portion 72 of the third linkage 16C can thus be moved in three dimensions.

[0034] The second subsystem 10B is a mirror image of the first subsystem

is created having magnetic field lines sequentially through the arrangements 120A, B, C, D and E, whereafter the magnetic field lines return through the second portion 114, the core 110, and the first portion 112 to the magnets of the first arrangement 120A.

[0043] Referring again to Figure 3, the rotor 108 includes a plurality of rotor components 130, a link 132, and an arm 134.

[0044] Each rotor component 130 is a planar member which in the preferred embodiment is made from a printed circuit board for low cost. The rotor component 130 has a central opening 138 which is located over the outer surface 118 of the magnet support 106. Each rotor component 130 is located within a respective rotor gap 122. A portion of each rotor component 130 also extends out of the respective rotor gap 122 and is located externally of the magnets 104. The link 132 is inserted through openings in the portions of the rotor components 130 located externally of the magnets 104. The rotor components 130 are thereby mounted to one another.

[0045] A pin 140 is secured to the second portion 114 of the housing 102. A ball bearing 142 is located on an outer surface of the pin 140. A lower end of the arm 142 has a recess 144 therein located over the ball bearing 142. The arm is thereby mounted to bearing 142 for rotation about the axis 116. The link 132 is secured to an upper end of the arm 134. All the components of the rotor 108 are thereby mounted to the housing 102 for rotation about the axis 116. In the